

## *GaAs MMIC SMT DOUBLE-BALANCED MIXER, 1.5 - 4.5 GHz*

### Typical Applications

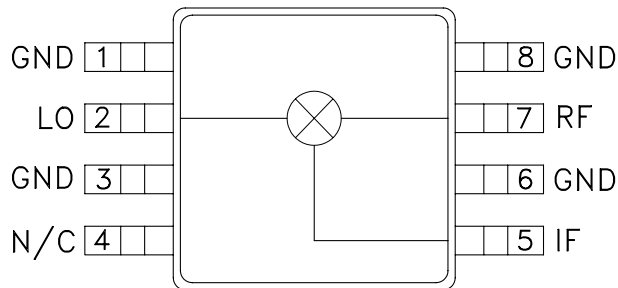
The HMC213MS8 is ideal for:

- Base Stations
- PCMCIA Transceivers
- Wireless Local Loop

### Features

- Ultra Small Package: MSOP8
- Conversion Loss: 8.5 dB
- LO / RF Isolation: 40 dB

### Functional Diagram



### General Description

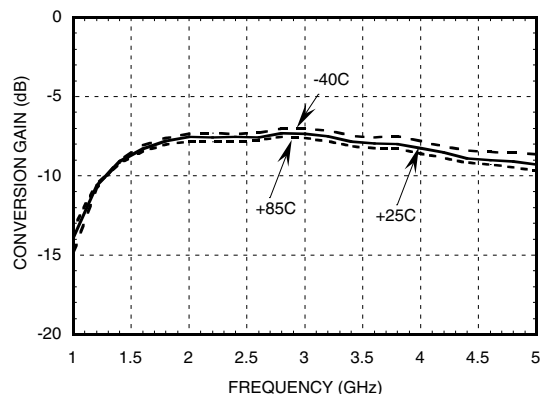
The HMC213MS8 is an ultra miniature double-balanced mixer in an 8 lead plastic surface mount package (MSOP). This passive MMIC mixer is constructed of GaAs Schottky diodes and novel planar transformer baluns on the chip. The device can be used as an upconverter, downconverter, biphas (de)modulator, or phase comparator. The consistent MMIC performance will improve system operation and assure regulatory compliance.

### Electrical Specifications, $T_A = +25^\circ \text{C}$ , As a Function of LO Drive

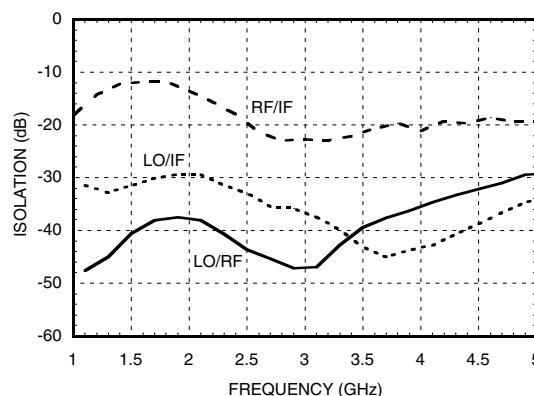
Parameter	LO = +13 dBm IF = 100 MHz			LO = +10 dBm IF = 100 MHz			Units
	Min.	Typ.	Max.	Min.	Typ.	Max.	
Frequency Range, RF & LO	1.5 - 4.5			1.7 - 3.6			GHz
Frequency Range, IF	DC - 1.5			DC - 1.5			GHz
Conversion Loss		8.5	10		9	10.5	dB
Noise Figure (SSB)		8.5	10		9	10.5	dB
LO to RF Isolation	29	40		32	40		dB
LO to IF Isolation	27	35		26	35		dB
IP3 (Input)	16	19		14	18		dBm
1 dB Gain Compression (Input)	7	10		5	8		dBm

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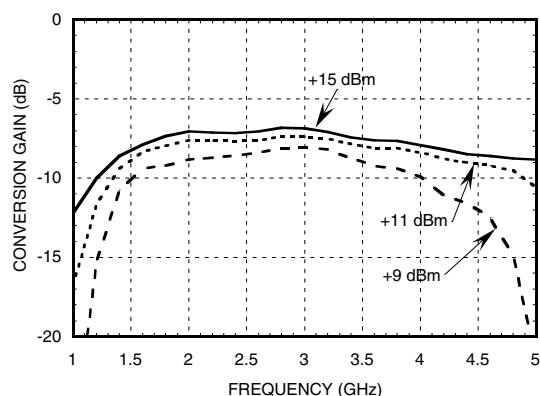
**Conversion Gain vs. Temperature @ LO = +13 dBm**



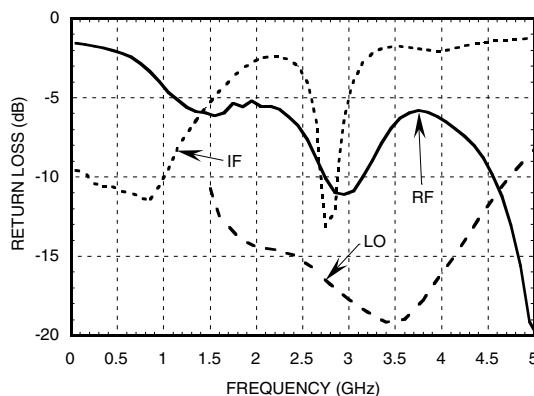
**Isolation @ LO = +13 dBm**



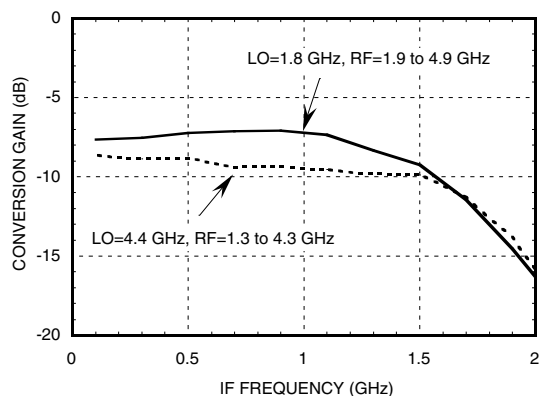
**Conversion Gain vs. LO Drive**



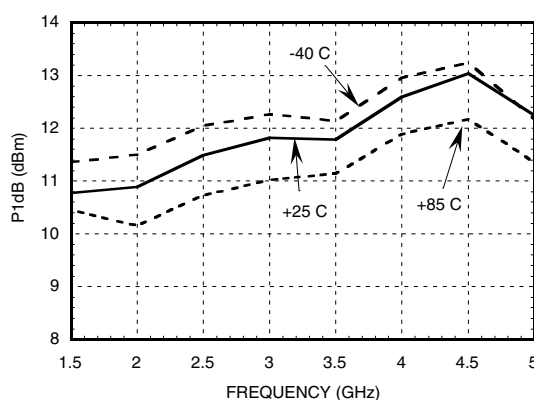
**Return Loss @ LO = +13 dBm**



**IF Bandwidth @ LO = +13 dBm**

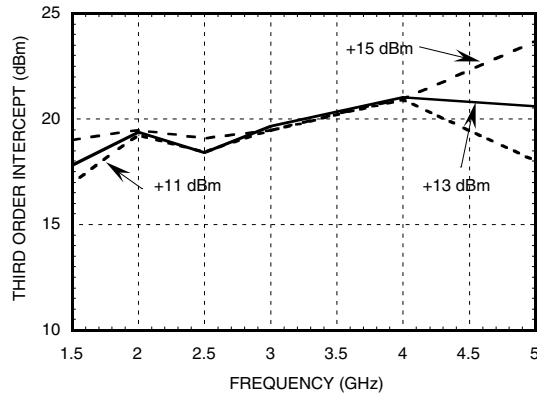


**P1dB vs. Temperature @ LO = +13 dBm**

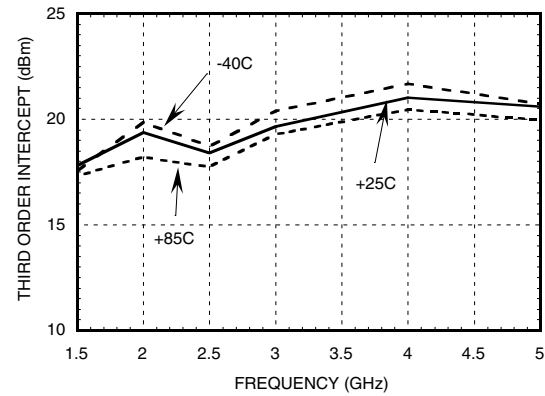


## GaAs MMIC SMT DOUBLE-BALANCED MIXER, 1.5 - 4.5 GHz

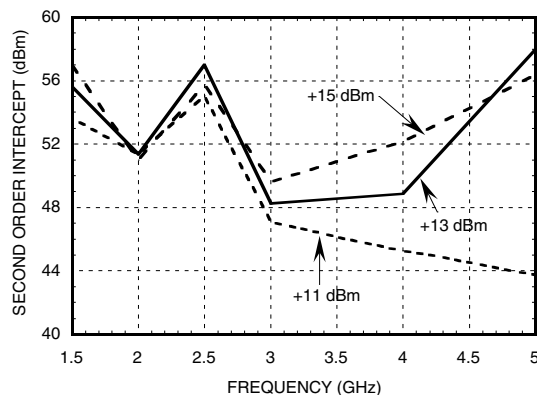
**Input IP3 vs. LO Drive**



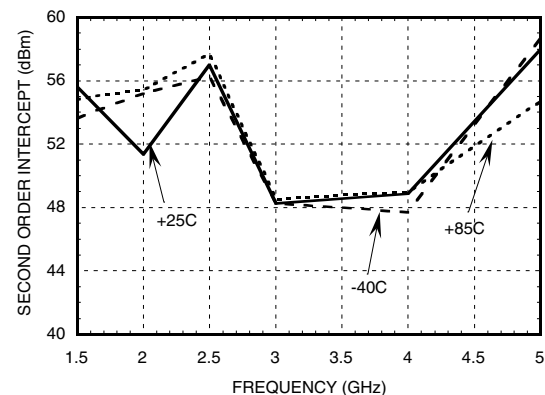
**Input IP3 vs. Temperature @ LO = +13 dBm**



**Input IP2 vs. LO Drive**



**Input IP2 vs. Temperature @ LO = +13 dBm**



**MxN Spurious Outputs**

mRF	nLO				
	0	1	2	3	4
0	xx	14.4	19.5	16.8	41.5
1	15.6	0	51.7	47.9	68.3
2	72.8	84.3	71.1	85.6	68.1
3	>105	>105	>105	77.2	>105
4	>105	>105	>105	>105	>105

RF = 3.5 GHz @ -10 dBm  
LO = 3.6 GHz @ +13 dBm  
All values in dBc below IF power level (-1RF + 1LO)

**Harmonics of LO**

LO Freq. (GHz)	nLO Spur at RF Port			
	1	2	3	4
1.5	42	35	53	52
2.0	38	28	57	60
2.5	43	28	34	60
3.0	49	33	34	62
3.5	40	41	46	64
4.0	36	45	54	62
4.5	32	54	55	75
5.0	29	53	55	70

LO = +13 dBm  
Values in dBc below input LO level measured at RF Port.

## GaAs MMIC SMT DOUBLE-BALANCED MIXER, 1.5 - 4.5 GHz

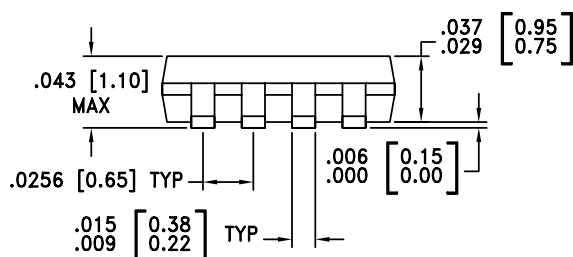
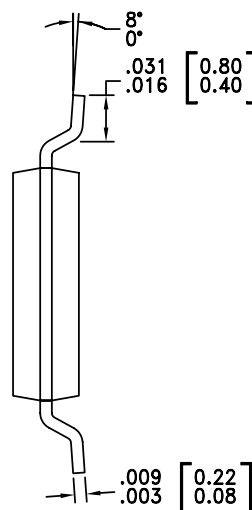
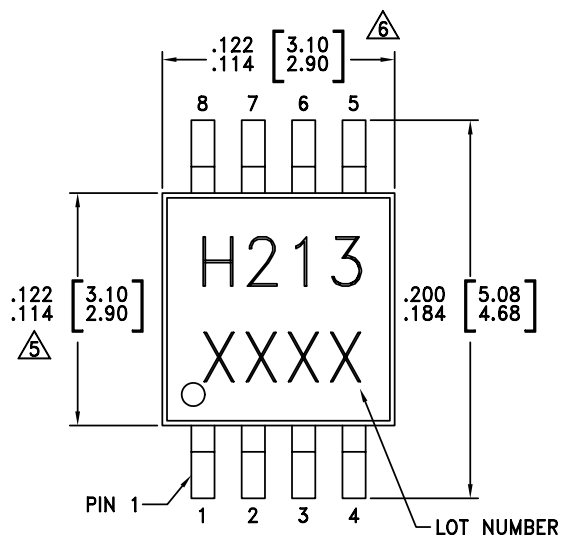
### Absolute Maximum Ratings

RF / IF Input	+13 dBm
LO Drive	+27 dBm
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C



ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS

### Outline Drawing

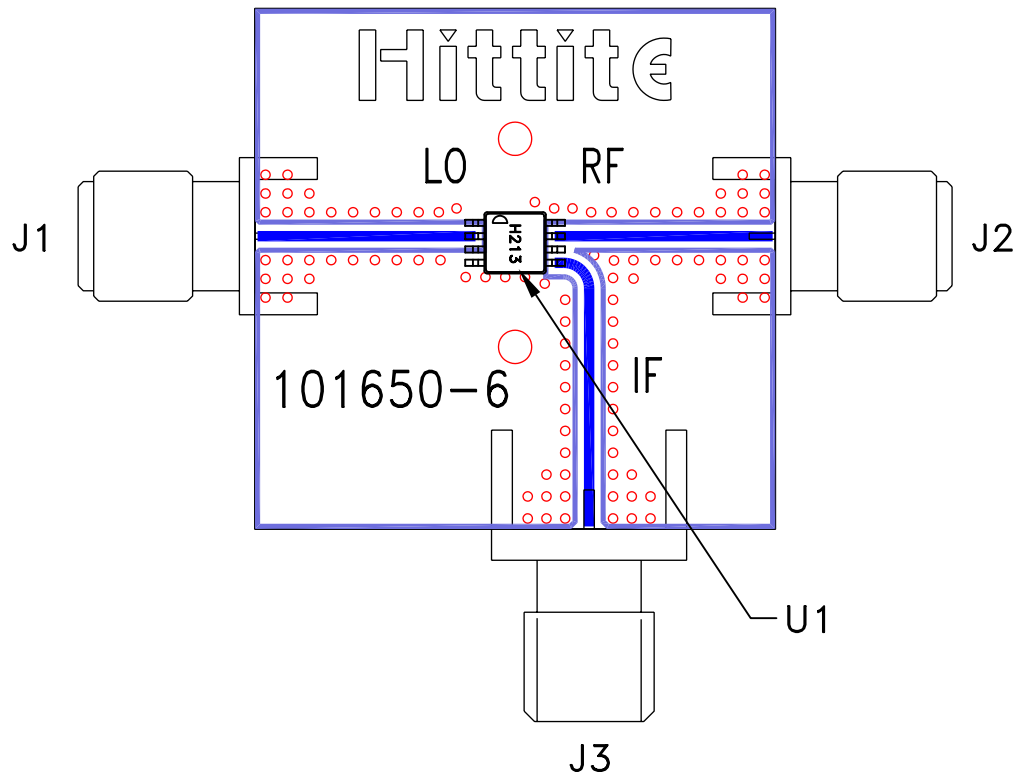


#### NOTES:

1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
2. LEADFRAME MATERIAL: COPPER ALLOY
3. LEADFRAME PLATING: Sn/Pb SOLDER
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
6. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
7. ALL GROUND LEADS MUST BE SOLDERED TO PCB RF GROUND.
8. CLASSIFIED AS MOISTURE SENSITIVITY LEVEL (MSL) 1.

## *GaAs MMIC SMT DOUBLE-BALANCED MIXER, 1.5 - 4.5 GHz*

### *Evaluation Circuit Board*



### *List of Material*

Item	Description
J1 - J3	PC Mount SMA RF Connector
U1	HMC213MS8 Mixer
PCB*	101650 Evaluation Board
* Circuit Board Material: Rogers 4350	

The circuit board used in the final application should use RF circuit design techniques. Signal lines should have 50 ohm impedance while the package ground leads and exposed paddle should be connected directly to the ground plane similar to that shown. A sufficient number of VIA holes should be used to connect the top and bottom ground planes. The evaluation circuit board shown is available from Hittite upon request.

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### **Notes:**